

## Maternal Influences on Smoking Initiation Among Urban Adolescent Girls

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### **Abstract:**

This study examined associations between maternal social influences to smoke and girls' early smoking behaviors. Data were collected separately from 450 urban minority girls (65.7% Black, 21.5% Latina, and 12.8% other) and their mothers on smoking frequency as well as demographic and social factors hypothesized to promote smoking. Results showed perception of mothers' smoking to be associated with girls' early smoking behaviors, whereas mothers' report of their smoking status was not. Interactions were found between ethnicity and perception of mothers' smoking, with Black girls more influenced by their perceptions of mothers' smoking status and by mothers' expectations of adult smoking than Latinas. Findings are discussed in terms of implications for preventive efforts and recommendations for future studies with urban populations.

**Keywords:** Social influences | Maternal influences | Smoking | Ethnicity | Adolescent girls

### **Article:**

Despite a plethora of prevention programs, policy initiatives, and media attention, smoking among adolescents continues to be a pressing concern for our nation. Smoking initiation and early experimentation with cigarette smoking occurs through a complex mixture of cognitive, attitudinal, social, personality, pharmacological, and developmental factors (Jessor & Jessor, 1977; Meyer & Mirin, 1979; Ray, 1974). Social influences are consistently found to be among the most potent influences to smoke cigarettes. Particularly important is the actual behavior of parents, siblings, and friends with respect to tobacco use. Adolescents who have people in their immediate social network who smoke cigarettes are significantly more likely to become smokers themselves (Botvin & Botvin, 1992). The present investigation examines maternal smoking

behaviors, maternal attitudes (expectations about adult smoking, attitudes toward smoking), and girls' perceptions of maternal smoking as influences on smoking intentions and experimental smoking among urban, minority girls.

Smoking, one of the leading causes of death and disability in adulthood (U.S. Department of Health and Human Services [USDHHS], 1994), has its origins of use in adolescence (Millman & Botvin, 1992). National survey data (Johnston, O'Malley, & Bachman, 2001) show 15% of 8th graders, 24% of 10th graders, and 31% of 12 graders are current smokers (smoked at least one cigarette in the past 30 days). Although historically smoking rates were greater among males, gender differences in smoking are now virtually nonexistent (French & Perry, 1996). Daily smoking among 8th graders is currently 7.5% for boys and 7% for girls, for 10th graders the rates are 14% for both sexes, and for 12th grader that rates are 21% for boys and 20% for girls (Johnston et al., 2001).

Although there are no differences in adolescent smoking rates by gender, significant differences have consistently been found by race. In 2000, 37.9% of White high school seniors were current smokers compared with 27.7% of Latinos and 14.3% of Blacks (Johnston et al., 2001). Similar patterns have been found when gender is examined within race and ethnicity. In the most recent national household survey (USDHHS, 2001a), among the 12- to 17-year-old population, 6.3% of Black girls had smoked cigarettes in the past month as compared with 9.8% of Latinas and 17.2% of White girls.

Concerns about the adverse health effects of smoking for women have increased in recent years. Lung cancer has surpassed breast cancer as the leading cause of cancer death in women, and cigarette smoking is the source of several unique health risks for women, including increased risk of osteoporosis, cervical cancer, spontaneous abortions, preterm births, low birth weight babies, and fetal and infant death (USDHHS, 2001b). Smoking may pose additional risks for minority and disadvantaged women. Although smoking rates have historically been lower for minority women than for their White counterparts (USDHHS, 2001b), minority women may still be at increased risk of developing smoking-related diseases. Black women, for example, are disproportionately affected by several conditions exacerbated by smoking, including hypertension, diabetes, and delivery of low-birth-weight babies (Brown et al., 1995). Moreover, existing evidence may underestimate the hazards of cigarette smoking for minority women because minority women in particular have been understudied in health behavior research. It is therefore all the more critical to examine early smoking behaviors among adolescent minority girls.

As indicated, the association between parental and adolescent smoking has been well established in the literature. Parents who smoke are more likely to have children who smoke (Bauman, Foshee, Linzer, & Koch, 1990; Chassin, Presson, Todd, Rose, & Sherman, 1998; Green MacIntyre, West, & Ecob, 1991). According to social learning theory (Bandura, 1977), parents who smoke act as role models for their children, who then imitate the practices they see in their

everyday lives. Children are made aware of the consequences of their parent's smoking and, if the outcomes appear beneficial, are more likely to engage in this behavior themselves. Although studies on smoking transmission have shown stronger parental effects when both parents smoke (Kandel & Wu, 1995), mothers have been found overall to be more influential in their children's tobacco use than fathers, and this effect has been particularly evident for girls (Andrews, Hops, Ary, Tildesley, & Harris, 1993; Chassin et al., 1998; Griesler, Kandel, & Davies, 1998; Kandel & Wu, 1995). Higher rates of adolescent smoking have also been found within low-income families and families where parents have low educational attainment (USDHHS, 1994).

The majority of studies on parental modeling have been conducted with adolescents' report of their parents' smoking status (Bauman et al., 1990; Charlton & Blair, 1989; Chassin, Presson, & Sherman, 1984; Chassin, Presson, Sherman, Montello, & McGrew, 1986; Hu, Flay, Hedeker, Ohidul, & Day, 1995; Jackson & Henriksen, 1997; Simons-Morton, Haynie, Crump, Eitel, & Saylor, 2001). Far fewer studies have used independent parental report of their own smoking (Chassin et al., 1998; Kandel & Wu, 1995; Melby, Conger, Conger, & Lorenz, 1993; Murray, Kiryluk, & Swan, 1985). According to Jessor's problem behavior theory (Jessor & Jessor, 1977), perceived smoking by parents should have a stronger influence on adolescent smoking than actual use. However, because so few studies include both parental reports of smoking and adolescents' perceptions of their parents' smoking, this has yet to be tested in the literature. In addition, little research has examined discrepancies between adolescent and parental report of parents' smoking status. Although heavy smoking is an easily identifiable behavior, it may be more difficult for children to assess accurately parental smoking among adults with light or erratic smoking habits. Likewise, some parents may attempt to conceal their smoking from their children in an effort to reduce their influence. Research is needed to examine the potential effect of adolescents' misperceptions of their parents' smoking status on their own smoking behaviors.

Some research has suggested that for minority adolescents, smoking among adult role models may be less important, at least among Black adolescents (Botvin, Baker, Goldberg, Dusenbury, & Botvin, 1992; De Moor, Elder, Young, Wildey, & Molgaard, 1989; Headen, Bauman, Deane, & Koch, 1991). Robinson, Klesges, Zbikowski, and Glaser (1997) found that the strongest association between familial smoking and adolescent experimental smoking existed for White girls. Although statistically significant, the effect of familial smoking on experimental smoking for Black girls and boys was considerably smaller.

For some minorities there may be less modeling of adult smoking occurring in the home. Robinson and Klesges (1997) found Black children reported less smoking by parents than White children. The authors proposed several suggestions on why this may be the case, including that familial smoking may be lower among Black youth because of a greater number of households headed by women who have generally smoked less than men (USDDHS, 2001b). In addition, although Black adults are more likely to smoke than White adults, they do so at lower levels (Substance Abuse and Mental Health Services Administration [SAMHSA], 1998); therefore, the level of smoking by Black parents may be low enough that their children do not

recognize them as smokers. Other studies have also found higher rates of maternal smoking among White mothers as compared with minority mothers; however, other than the differences in these rates, the effect of maternal smoking on the initiation of adolescent smoking was found to be similar across ethnic groups (Griesler, Kandel, & Davies, 2002; Gritz et al., 1998). Additional research is needed to clarify the effects of maternal smoking within minority populations.

Modeling smoking behavior is one way parents influence their children's smoking behavior. However, other parental behaviors have also been found to influence children's smoking. Low parental monitoring or involvement, harsh discipline, and lack of support or warmth have all been associated with increases in smoking experimentation (Biglan, Duncan, Ary, & Smolkowski, 1995; Chassin et al., 1998; Melby et al., 1993; Simons-Morton et al., 2001). In addition, engaging in smoking-specific practices such as establishing rules and policies regarding smoking, engaging in discussions about tobacco use, and endorsing antismoking attitudes and expectations about smoking (both generally and in terms of their children specifically) have been found to decrease children's risk and experimentation with smoking (Chassin, et al., 1998; Jackson & Henriksen, 1997; Kandel & Wu, 1995; Proescholdbell, Chassin, & MacKinnon, 2000).

Minority families can differ from White mainstream families in various ways, which may affect the association between parental behaviors and adolescent smoking. Minority families are more likely to be composed of single parents; they make greater use of extended family members; and they often hold different values, beliefs, and goals from the mainstream culture (Garcia Coll et al., 1996). For example, Black parents have been found to engage in more antitobacco socialization practices in the home and to have stronger beliefs in the efficacy of their antitobacco efforts than White parents (Clark, Scarisbrick-Hauser, Gautam, & Wirk, 1999). In addition, Mermelstein and The Tobacco Control Network Writing Group (TCNWG; 1999) found both Black and Latino youth were more likely than White youth to view smoking as disrespectful to their parents and to feel that their smoking would reflect poorly on their parents. In this same study, minority youth were more likely than White youth to believe their parents would punish them harshly for smoking and reported receiving stronger antismoking messages. However, Latino youth were also more likely to report contradictory messages from their parents, such as sending them to the store to purchase cigarettes or having them light a cigarette. Given the differences by race and ethnicity in both tobacco-specific and general household environmental factors, greater attention needs to be focused on the moderating effects of race and ethnicity on parental smoking influences.

Regardless of actual levels of use in their immediate environment, adolescents have been found to overestimate the number of adults and teenagers who smoke (Bauman, Botvin, Botvin, & Baker, 1992). This overestimation produces an expectation of smoking as normative and has been associated with an increased use of cigarettes among adolescents (Scheier & Botvin, 1997). Although many studies have been done on normative expectations of smoking among

adolescents, normative expectations of smoking among parents has not been assessed. Parents who believe that smoking is a normative adult behavior and who overestimate adult smoking rates may inadvertently influence their children's smoking. It may be that parents who believe smoking to be a common behavior among adults are less likely to see adolescent smoking as deviant and therefore would be less likely to intervene in their children's smoking behaviors or to establish clear antismoking guidelines. As such, maternal normative expectations of adult smoking may be an important influence on girls' smoking initiation.

The current study was designed to examine which maternal social influences are associated with cigarette use among urban minority girls. As such, it was designed to fill several gaps in the literature. First, this study captured early experimental smoking by using a sample of young adolescents. Second, the study focused almost exclusively on minority girls, a population that has been severely underrepresented in the published literature. Third, the study assessed the normative expectations of adult smoking for mothers as well as for adolescent girls. Fourth, this study examined the ways social influence risk factors may be moderated by racial and ethnic backgrounds across minority groups (Black and Latina). And finally, because the study used data gathered from both adolescent girls and their mothers, it was able to examine the relative importance of perceived versus actual social influences as well as potential discrepancies between the two reports of maternal smoking.

## **Method**

### **Procedure**

Thirty New York City public ( $N=23$ ) and parochial ( $N=7$ ) middle schools were recruited for a larger drug prevention study. These schools were selected from districts known to have low socioeconomic status (SES) based on the New York City Board of Education's poverty index and with at least 80% to 85% minority students. All 7th graders in English-speaking, mainstream classes were invited to participate in the study, and approximately 82% participated in the baseline assessment. A passive consent procedure was used to obtain parental consent. The drug prevention study was designed to test a broad-based, competency-enhancement approach against an information-only approach to alcohol, tobacco, and drug use prevention. Individual schools were randomly assigned to the experimental and control conditions. The larger study included several phases: an in-school baseline survey for adolescents, a telephone interview for mothers of adolescent girls, a school-based drug prevention intervention, and annual follow-up surveys. Only baseline data were used in the current study to avoid any confounds with potential intervention effects.

The collection of adolescent data took place in the school, within students' regular classrooms. As mandated by the New York City Board of Education, teachers remained in the classroom; however, they were not involved in any of the data-collection activities. Instead, a team of three

to five data collectors, who were either Black or Latino, administered the questionnaire following a standardized protocol.

All participating students completed a pretest questionnaire that measured self-reported drug use as well as several cognitive, attitudinal, and psychological characteristics hypothesized to be related to drug use initiation. Steps were taken to ensure the quality of self-report data. First, identification codes rather than names were used to emphasize the confidential nature of the questionnaire. Second, carbon monoxide (CO) breath samples were collected from adolescents using a variation of the bogus pipeline procedure. Students were told that the CO levels in expired air can be used as a measure of smoking status. The collections of CO or other objective measures of smoking status have been shown to enhance the veracity of self-reported smoking data (Evans, Hansen, & Mittlemark, 1977).

Women listed as parents or guardians, as per school contact lists, of the adolescent girls participating in the larger study were contacted and asked to participate in a 15-min telephone interview. For the sake of convenience, these women will be referred to as “mothers” for the remainder of the article; however, they may in fact represent stepmothers, other relatives, or foster parents. Contact names were verified during the 15-min interview, but the exact relationship with the target child was not assessed. The telephone interview was designed to take place after the in-school data collection but before implementation of the intervention. As such, original school lists of all potential female participants were used for recruiting mothers into the study.

The lists were screened by student gender, and 1,601 phone numbers were available for recruitment. This list was used until approximately 500 women were interviewed. Interviews were completed with 498 women (31% of the available population) before the end of the data-collection phase. On reviewing completed interviews, 450 were found to match with adolescent girls in the larger study (15% of the larger study) and are included in the current analyses.

## **Participants**

Participants were 450 mother–daughter dyads. A series of chi-square analyses were conducted to assess potential differences on key variables under investigation between girls whose mothers participated in the telephone interview (i.e., the sample for the present investigation) and girls who participated in the larger study but whose mothers did not participate in the telephone interview. Significant differences were found for intentions to smoke,  $\chi^2(1)=7.35, p<.01$ ; school type,  $\chi^2(1)=19.70, p<.001$ ; and race,  $\chi^2(1)=12.56, p<.001$ , and a trend was found for experimental smoking,  $\chi^2(1)=3.08, p<.10$ . Girls in the current study reported marginally lower smoking rates (18% vs. 22%) and lower intentions to smoke in the future (24% vs. 30%) and were more likely to attend parochial schools (13% vs. 7%) and were more likely to be Black (66% vs. 57%). Although the smoking behaviors in the current sample were lower than the larger sample, they reflect the rates of smoking among minority girls of this age. Because the intent of the current

study was to examine influences on minority adolescent girls, this is not seen as a major flaw of the study.

The mean age for girls was 12.86, with a range from 11.4 to 15 years of age. The girls were predominately minority, with 21.5% of the girls reporting themselves as Latina, 65.7% as Black, 2.9% as Asian, 2.9% as White, and 7% as other or biracial. Mothers reported similar racial and ethnic breakdowns: 25.6% Latina, 63.7% Black, 3.0% Asian, 3.0% White, and 4.2% other. The majority of mothers had low educational attainment, with more than half (52.9%) going no further than the 12th grade. Among the women who were willing to reveal their age (76.7%), the mean age was 39.7 ( $SD=8.67$ ), with a range from 25 to 77 years old.

## Measures

Both the girls' in-school survey and the mothers' telephone survey included general demographic data, smoking behavior, and a variety of social influence variables.

**Background variables.** Self-reported data concerning the characteristics of participants were collected. In addition, a dichotomous variable that assessed the type of school the girl attended was created, where 1 represents parochial schools and 0 represents public schools. For girls, background characteristics included each participant's age, race or ethnicity, and household structure. Two separate dichotomous variables were created to capture the effect of the two largest racial or ethnic categories in the sample: Black (where 1 represented participants who were Black and 0 represented all other students) and Latina (where 1 represented participants who were Latina and 0 represented all other students).

The majority of girls (84.2%) reported living with their own mother, either with a father or stepfather (51.8%) or with their mother alone (32.4%). The rest of the sample (15.8%) reported living in another type of household structure. These included stepmother and father, grandparents or other relatives, and foster parents or guardians. Household structure as reported by girls was collapsed into three groups: mother-only household, no biological mother in household, and two-parent households. For analyses, a simple contrast was used where two-parent households were used as the reference group and each group was compared with the reference group (coded as 2 vs. 1 for mother only vs. two parent, and coded as 3 vs. 1 for no biological mother vs. two parent).

**Girls' smoking.** Girls were asked how often they smoked cigarettes, with response categories consisting of 1 (*never tried it*), 2 (*a few times but not in the past year*), 3 (*a few times a year*), 4 (*once a month*), 5 (*a few times a month*), 6 (*once a week*), 7 (*a few times a week*), 8 (*once a day*), and 9 (*more than once a day*). Because of the expected low rates of smoking and to correct for the skewed nature of the data, a dichotomous variable was computed with 1 representing ever having used cigarettes (18.1%) and 0 representing never having used cigarettes (81.9%).

**Girls' smoking intentions.** Intention to smoke within the next year was assessed with a single item: “Do you think you will use cigarettes with the next year?” Response options ranged from 1 (*definitely not*) to 5 (*definitely will*). Again, to correct for the skewed nature of the data, a dichotomous variable was computed, with 0 representing definitely no intentions to smoke in the next year (76.4%) and 1 representing all other responses (23.6%).

**Mothers' smoking.** Mothers' smoking status was measured with two separate variables: girls' perceptions of their mothers' smoking status and mothers' report of their own smoking status. Girls' perception of mothers' smoking was assessed with a single item: “Does your mother smoke cigarettes?” Responses included *no*, *don't know*, *used to but quit*, and *yes*. A dichotomous variable was formed where *yes* was coded as 1, *used to but quit* was collapsed with *no* and coded as 0, and *don't know* was treated as missing information.

Mothers' report of their own smoking status was assessed with a single item: “Do you smoke cigarettes?” Response categories included *yes*, *no*, and *used to but quit*. The response *used to but quit* was combined with *no* to create a dichotomous measure of smoking. Again, a dichotomous variable was created with *yes* coded as 1 and *used to but quit* being collapsed with *no* and coded as 0. Mothers' self-reported smoking rates were 22.0% current smokers, 4.2% former smokers, and 73.7% never smoked. National data show current smoking rates to be 22% among women in general (USDHHS, 2001b) and 23.5% for White women, 21.9% for Black women, and 13.8% for Latina women.

**Normative expectations.** Normative expectations of adult smoking were assessed for girls and for mothers. Both were asked how many adults they believe smoke cigarettes. Responses ranged from 1 (*none*) to 5 (*all or almost all*). Girls' mean score for normative expectations was 3.76 ( $SD=1.16$ ); mothers' mean score was 3.57 ( $SD=.98$ ). Variables for normative expectations (both girls' and mothers') were dichotomized so that 0 represented reporting that *none* to *about half* of adults smoke and 1 represented reporting that *all* or *almost all* adults smoke. This was done to identify girls and women who drastically overrepresented the number of adults who smoke and aid in the interpretability of odds ratios in the subsequent logistic regressions. Because the current national prevalence of adult smoking is 24% (USDHHS, 2001a), believing that more than half of adults smoke was seen as a drastic overrepresentation.

**Maternal attitudes toward smoking.** Mothers' attitudes toward children's smoking were assessed with a three-item scale ( $\alpha=.81$ ) that measured the acceptability of smoking by children in the family. Items included: “In your family, a good way to show that you are grown up is to smoke,” “In your family, it is viewed as okay for teenagers to smoke,” and “In your family, it's okay for children to smoke at home.” Responses for all items ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Items on this scale were averaged, with high scores indicating positive attitudes toward children smoking. The mean score for smoking attitudes was 1.49 ( $SD=.58$ ).

## Results

Table 1 shows the demographic characteristics for both mothers and daughters and Table 2 shows the bivariate associations among all study variables. Although significant associations were found, the majority would be classified as weak in strength according to Cohen's (1988) definition of effect sizes. Girls' perception of mothers' smoking and mothers' report of smoking status were significantly associated, as would be expected, but the association was only moderate in strength. Likewise, the two outcome measures (experimental smoking and smoking intentions) were positively associated. In addition, both experimental smoking and intentions to smoke in the future were associated with girls' perceptions of their mothers as a smoker and their normative expectations of smoking, but neither was associated with mothers' report of their own smoking status.

**Table 1.** Sample Characteristics

	<i>N</i>	%
<i>Girls</i>		
Race		
Black	293	65.7
Latina	96	21.5
Other	57	12.8
School type		
Parochial	57	12.7
Public	393	87.3
<i>Mothers</i>		
Race		
Black	277	63.8
Latina	111	25.6
Other	46	10.6
Marital status		
Single	105	23.7
Married	237	53.5

Separated or divorced or widowed	101	22.8
Grade completed		
<12	90	20.1
12	236	52.9
>12	120	27.0
Number of children		
1	95	21.2
2	148	33.0
3	126	28.1
4 or more	79	17.4

**Table 2.** Spearman Rho Correlations Among Study Variables

	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>
1. Black	–											
2. Latina	-.73**	–										
3. School type	-.02	-.02	–									
4. Age	-.08	.04	-.16**	–								
5. Household structure	.17**	-.10*	-.08	.11*	–							
6. Mothers' education	.07	-.13***	.05	-.04	-.08	–						
7. Girls' experimental smoking	-.08	.02	-.01	.08	.13**	-.06	–					
8. Girls' smoking intentions	-.08	.09	-.05	.10*	.07	-.07	.45***	–				

9. Girls' perception of mother's smoking	-.02	.00	-.05	.13**	.13**	-.04	.17**	.22***	-			
10. Mothers' report of smoking	-.05	.09*	-.01	-.02	.06	-.07	-.03	.05	.28***	-		
11. Normative expectations (girls)	.00	-.06	.00	.06	.07	.01	.22***	.20***	.18***	-.05	-	
12. Normative expectations (mothers)	.14**	-.16**	.09	.03	-.03	-.04	.05	.07	.03	.01	.00	-
13. Smoking attitudes (mothers)	-.04	-.01	-.08	.12**	-.01	.10*	.01	.00	.10*	.07	-.07	.07

A series of logistic regressions were conducted to examine the associations between the social influence variables and girls' smoking behaviors. Logistic regressions were used to correct for the skewed nature of the smoking data. Several background variables that tap factors found to be associated with experimental smoking in other studies were included as control measures. Specifically, girls' age,<sup>1</sup> racial or ethnic background, household status, mother's education, and school type were used.

### Perceived Versus Actual Report of Mothers' Smoking

Separate regressions were estimated to test the effects of maternal smoking and perceived maternal smoking on girls' smoking behaviors. For smoking intentions, experimental smoking was entered first to control for girls who were already experimenting. Mothers' report of their own smoking was not predictive of either girls' experimental smoking,  $\chi^2(1)=.37, ns$ ; odds ratio (OR) = .83, 95% confidence interval (CI)=.45, 1.54, or their intentions to smoke in the next year,  $\chi^2(1)=.23, ns$ ; OR=1.43, 95% CI=.80, 2.58. Girls' perception of their mothers' smoking was associated with both their own smoking experimentation,  $\chi^2(1)=11.00, p<.001$ ; OR=2.55, 95% CI=1.48, 4.38, and their intentions to smoke in the future,  $\chi^2(2)=79.48, p<.001$ ; OR=2.30, CI=1.30, 4.10.

### Associations Between Social Influence Variables and Girls' Smoking Behaviors

Next, multivariate logistic regressions were estimated with all control and social influence variables entered except for mothers' report of their own smoking because it was not significant in any of the preliminary analyses. Independent variables were entered in two blocks. Block 1 consisted of all background variables and Block 2 added the social influence variables. For the intentions-to-smoke models, experimental smoking status was included with the background variables. Entering the background variables in the first block allowed for a test of model improvement because Model 1 is completely nested within Model 2 (Menard, 2002). The difference between the two models is shown in Table 3 along with the odds ratios and confidence intervals for the individual items within each model.

**Table 3.** Associations Between Social Influence Variables and Girls' Smoking Behaviors

	<i>Experimental Smoking</i>				<i>Smoking Intentions</i>			
	<i>Model 1</i>		<i>Model 2</i>		<i>Model 1</i>		<i>Model 2</i>	
	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>
Background								
Black	<b>.38</b>	<b>.18–.79</b>	<b>.38</b>	<b>.17–.83</b>	1.29	<b>.54– 3.06</b>	1.41	.58–3.44
Latina	.68	.29– 1.61	.83	.33–2.05	1.89	.72– 4.99	2.37	.87–6.46
School type (reference=public)	1.49	.68– 3.29	1.34	.58–3.06	.53	.21– 1.33	.47	.18–1.21
Age	1.60	.98– 2.64	1.47	.87–2.49	1.18	.71– 1.99	1.04	.61–1.77
Mother only (reference=two parent)	1.44	.76– 2.72	1.33	.69–2.58	1.02	.54– 1.90	.94	.50–1.78
No mother (reference=two parent)	<b>3.10</b>	<b>1.45– 6.64</b>	<b>2.77</b>	<b>1.26– 6.12</b>	.82	.36– 1.90	.73	.31–1.74
Mother's education	.92	.81– 1.04	.90	.79–1.04	.94	.82– 1.07	.93	.81–1.06
Experimental smoking	–	–	–	–	<b>10.79</b>	<b>5.68– 20.50</b>	<b>8.76</b>	<b>4.53– 16.92</b>

Social influence variables								
Mother's smoking status (perceived)	–	–	<b>1.89</b>	<b>1.01–3.54</b>	–	–	<b>1.96</b>	<b>1.05–3.67</b>
Normative expectations (girls)	–	–	<b>4.30</b>	<b>1.84–10.02</b>	–	–	<b>2.32</b>	<b>1.12–4.81</b>
Normative expectations (mothers)	–	–	1.73	.93–3.20	–	–	1.28	.70–2.32
Maternal attitudes toward smoking	–	–	.76	.44–1.33	–	–	1.01	.61–1.69
$RN^2$	.09		.19		.26		.30	
Block $\chi^2(df)$	$\chi^2(7)=20.41^{**}$		$\chi^2(4)=24.74^{***}$		$\chi^2(8)=67.33^{***}$		$\chi^2(4)=12.13^*$	
Model $\chi^2(df)$	$\chi^2(7)=20.41^{**}$		$\chi^2(11)=45.15^{***}$		$\chi^2(8)=67.33^{***}$		$\chi^2(12)=79.46^{***}$	

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ . *Note.* odds ratios in bold text indicate significant univariate effects at  $p < .05$  or better.

For experimental smoking, the model that included demographic variables only was significant and accounted for 9% of the variance. Inclusion of the social influence variables in Model 2 was a significant improvement over the demographics-only model and accounted for an additional 11% of the variance. Significant predictors in this final model included race and ethnicity, household status, girls' perception of mothers' smoking status, and girls' normative expectations of adult smoking. Specifically Black girls were less likely to have tried cigarettes than girls from other racial and ethnic backgrounds. The odds of girls from households without a biological mother having tried smoking were 2.77 times greater than girls who lived in two-parent families (there was no difference in the odds of experimental smoking between girls who lived with their mother only and those who lived in two-parent families). Girls who perceived their mothers to be smokers were 1.89 times more likely to have tried smoking than girls who perceived their mothers to be nonsmokers. Girls with high normative expectations of adult smoking were 2.89 times more likely to have tried cigarettes than girls with low normative expectations.

For intentions to smoke, the model that included demographic variables only and controlled for experimental smoking was significant and accounted for 26% of the variance. The addition of the social influence variables in Model 2 was also a significant improvement over Model 1 and accounted for an additional 4% of the variance. Significant predictors of the final model included experimental smoking, girls' perception of their mothers' smoking, and girls' normative expectations of adult smoking. Specifically, girls who perceived their mothers to be smokers were 1.96 times more likely to intend to smoke than girls who perceived their mothers to be

nonsmokers. Girls with high normative expectations were 2.32 times more likely to intend to smoke than girls with low normative expectations.

### **Ethnicity as Modifier of Effect of Social Influence Variables**

To examine how ethnicity may moderate the associations between social influence variables and girls' smoking behaviors, a series of logistic regressions were estimated where each social influence variable from the previous set of analyses and an ethnicity variable were entered along with an interaction term. Most of the sample was either Black or Latina, with low percentages of other groups (e.g., White, Native American, Asian). Because of cell size constraints for interaction terms, the “other” girls were omitted from these analyses and moderating effects of being Black or Latina were assessed. As with previous analyses, experimental smoking was entered as a control variable for all analyses with smoking intentions. None of the interaction terms was significantly associated with girls' experimental smoking beyond the main effect variables.

For intentions to smoke in the future, there were two significant interactions beyond the main effects model: between girls' ethnicity and their perceptions of their mothers' smoking status and between girls' ethnicity and their mothers' normative expectations. Table 4 shows the main effects models and the interaction models tested for both variables. To aid in the interpretation of the interaction terms, the individual odds for each cell within an interaction was calculated. The odds that Black girls who perceived their mothers to be smokers intended to smoke in the future were .39. The odds that Latinas who perceived their mothers to be smokers intended to smoke in the future were .18. This represents an odds ratio of 2.17. Specifically, among girls who perceived their mothers to be smokers, Black girls were twice as likely to intend to smoke than Latinas. A similar pattern holds for ethnicity and mothers' normative expectations. The odds that Black girls whose mothers have high normative expectations of adult smoking intend to smoke in the future were .21. For Latinas who have mothers with high normative expectations, the odds were .12. This represents an odds ratio of 1.75.

**Table 4.** Logistic Regression Models for Race and Ethnicity by Social Influence Interaction Terms for Smoking Intentions

	<i>Perception of Mother's Smoking</i>				<i>Mother's Normative Expectations</i>			
	<i>Model 1</i>		<i>Model 2</i>		<i>Model 1</i>		<i>Model 2</i>	
	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>
Experimental smoking	<b>11.25</b>	5.78–21.88	<b>12.05</b>	6.08–23.86	<b>11.64</b>	6.18–21.92	<b>11.34</b>	5.98–21.49

Race/ethnicity (Black)	.59	.31– 1.12	<b>.36</b>	.17– .76	.70	.37– 1.30	<b>.09</b>	.01– .68
Perception of mothers' smoking	<b>2.68</b>	1.42– 5.03	.70	.19– 2.58	–	–	–	–
Perception of Mothers' Smoking×Race/Ethnicity	–		<b>6.14</b>	1.36– 27.71	–	–	–	–
Mothers' normative expectations	–		–		1.25	.71– 2.20	.42	1.06– 17.49
Mothers' normative expectations×Race/Ethnicity	–		–		–	–	<b>4.31</b>	–
$R^2$	.30		.32		.25		.27	
Block $\chi^2(df)$	$\chi^2(3)=73.01^{**}$		$\chi^2(1)=5.91^*$		$\chi^2(2)=66.34^{**}$		$\chi^2(1)=4.50^*$	
Model $\chi^2(df)$	$\chi^2(3)=73.01^{**}$		$\chi^2(4)=78.91^{**}$		$\chi^2(2)=66.34^{**}$		$\chi^2(4)=70.83^{**}$	

\*  $p < .05$ ; \*\*  $p < .001$ . *Note.* odds ratios in bold text indicate significant univariate effects at  $p < .05$  or better.

### Differences in Perceptions of Maternal Smoking

To examine the associations between mothers' and daughters' report of mothers' smoking status, a 2×2 contingency table was computed. Almost three fourths (74%,  $n=304$ ) of the sample agreed on mothers' smoking behaviors. The majority of these agreements were that the mother does not smoke (63.3%,  $n=260$ ) and only a small number agreed that the mother does smoke (10.7%,  $n=44$ ). Disagreements were fairly evenly distributed between the other two possible cells: In 11.9% ( $n=49$ ) of the disagreements, the mother reported smoking when her daughter perceived her as a nonsmoker, and in 14.1% ( $n=58$ ) of the disagreements, the mother reported not smoking when her daughter perceived her as a smoker.

To check whether the high rate of discrepancies found in this sample could be explained by differences in household structure, the household structure variable was dichotomized so that 1 represented girls who reported living with their mother and 0 represented girls who reported living in a household without their mother (i.e., stepmother, grandmother, or other relatives). Two separate contingency tables were then estimated with this dichotomized variable. The distribution was found to be equivalent between girls who do (74% agreement) and do not (73% agreement) live with their mother. Likewise, to account for discrepancies that were the result of confusion over mothers having quit smoking, a contingency table was estimated between mothers' and girls' report of mothers' smoking using the original variables (before collapsing the

response *used to but quit* into *no*). However, the total number of discrepancies accounted for by the quit category was only 22 (21%).

Given the unexpected finding that mothers' report of their own smoking status was not significantly associated with girls' smoking behaviors and the large number of discrepancies between the two reports of maternal smoking, two additional logistic regressions were estimated to test associations between girls' smoking behaviors and discrepancies regarding mothers' smoking status. Although girls' perception of their mothers as smokers was associated with increased likelihood that they would experiment with cigarettes regardless of mothers' report, it was expected that the odds would be greater when both mothers' and daughters' reports matched than when there was a discrepancy. A categorical variable was created to capture agreements and disagreements regarding mothers' smoking status. The following four categories were included: (1) both participants agreed mother does not smoke, (2) mother reported being a smoker and daughter reported mother does not smoke, (3) mother reported being a nonsmoker and daughter reported mother as a smoker, and (4) both participants agreed mother smokes. Because quitting accounted for a relatively small percentage of the overall disagreement, quit categories were collapsed back into not smoking for the sake of these analyses.<sup>2</sup> Experimental smoking was regressed on this discrepancy variable so that each category was compared with the reference group, agreement of mother as a nonsmoker (Category 1). A similar regression was estimated for intentions to smoke, with the inclusion of girls' experimental smoking status as a control variable.

For experimental smoking,  $\chi^2(3)=13.73$ ,  $p<.01$ , girls who perceived their mothers to be smokers but had mothers who reported being a nonsmoker (Category 3) were 2.88 times more likely to have tried cigarettes than girls who agreed with their mothers that their mothers did not smoke (Category 1). The other two groups were not significant. For intentions to smoke, the discrepancy variable was marginally significant after controlling for experimental smoking status,  $\chi^2(3)=7.52$ ,  $p<.06$ . Girls who perceived their mothers to be smokers but had mothers who reported being a nonsmoker (Category 3) were 2.24 times more likely to intend to smoke than girls who agreed with their mothers that their mothers did not smoke (Category 1). In addition, girls who agreed with their mothers that their mother smokes (Category 4) were 2.27 times more likely to intend to smoke than girls who agree that their mothers did not smoke (Category 1).

## **Discussion**

This study examined several critical issues pertaining to maternal social influences and child smoking behaviors among a sample of urban minority mothers and daughters. Because urban minority women are often underrepresented in studies related to health and well-being, the extent to which previously established findings may apply to this population is not well known. Findings from the current study support the importance of maternal smoking behaviors on minority girls' early experimentation with cigarettes. Although some studies have shown adult influences to be less important for Black adolescents (Botvin et al., 1992; De Moor et al., 1989;

Headen et al., 1991), this study showed girls' perception of mothers' smoking and their normative expectations of adult smoking to be associated with their early smoking behaviors.

Many of the previous studies done with urban minority youth have not examined gender differences or looked at minority girls exclusively; therefore, it may be that maternal influences are more important for minority girls than for boys. Previous studies have also generally included influences from the peer environment on adolescent alcohol and tobacco use along with those from adult or family environment (Botvin et al., 1992; De Moor et al., 1989; Headen et al., 1991). The models tested in the current study assessed adult influences only. Future studies should include both genders as well as examine the relative influence of parents and peers.

Mothers' attitudes toward children's smoking were not associated with smoking behaviors among girls. Although previous studies have found associations among parental attitudes and children's smoking (Andrews et al., 1992; Chassin et al., 1984; Murray et al., 1985), it may be that attitudes, especially generalized attitudes, are not as important a socialization factor as are perceived use and normative expectations. A recent study by Anderson et al. (2002) showed maternal attitudes toward smoking to be significantly associated with children's smoking only when these beliefs are strongly felt and, perhaps more important, are in accordance with their own smoking behaviors. The small number of mothers who reported smoking in the current study made it impossible to conduct such tests with this sample. Future studies should include more specific attitudes toward the target child's smoking as well as interactions between mothers' smoking behaviors and their smoking attitudes.

The lack of associations may also be caused by the limited variability within the measure, with the majority of mothers in the sample either disagreeing or strongly disagreeing with all statements that supported smoking among children. This lack of positive attitudes toward children's smoking is consistent with previous research that has shown greater parental antismoking socialization practices among Black families as compared with White families (Clark et. al., 1999).

How race and ethnic backgrounds moderated social influences to smoking was also examined in the current study. The findings suggest that maternal influences, specifically perception of maternal smoking and mothers' normative expectations of adult smoking, may be particularly important for Black girls' intentions to engage in smoking before any actual experimentation. Black girls are almost twice as likely to intend to smoke than Latinas when maternal social influences to smoke are high (they either perceived their mothers to be smokers or their mothers held high expectations of adult smoking). Although this seems contrary to previous findings that have suggested Black adolescents are less influenced by adult role modeling, the majority of these studies have not examined gender differences and have not made comparisons across minority groups. We found no studies that have compared Black girls and Latinas. Additional research is needed to assess differences in the associations between social influences and girls' smoking experimentation across multiple ethnicities.

It should be noted that interaction effects are difficult to demonstrate in field studies (McClelland & Judd, 1993), and in the current study, where the numbers of smokers were minimal, it was particularly hard to show effects. Therefore, the significant interactions found in the current study are worthy of future attention. Altogether, eight interaction models were tested across the two outcomes, and although none of the interactions was significant with experimental smoking, two of the four interactions tested with intentions to smoke were significant. The current findings suggest an important new direction for the field and highlight the need for a closer examination of smoking risk factors among different minority groups.

This study assessed the normative expectations of adult smoking for both mothers and adolescent girls. Because the influence of mothers' own normative expectations of smoking on children's subsequent smoking behaviors has not yet been examined in the field, this represented a relatively new area of study. Mothers' normative expectations of adult smoking were not associated either with girls' experimental smoking or with their intentions to smoke in the future, once girls' perception of their mothers' smoking status and their own normative expectations were included. However, as noted earlier, girls' ethnic background altered the association between mothers' normative expectations and their intentions to smoke in the future, suggesting that this may be an important area of influence for Black girls. Because of the lack of previous research in this area, the degree to which adults overestimate adult smoking is not clear. In the current study, half (50.2%) of adult women held high normative expectations of adult smoking. Among Black women, 55% believed that all or almost all of adults smoke cigarettes as compared with 35% of Latinas. These findings suggest that adding activities that correct normative expectations of smoking to parenting programs or incorporating joint homework assignments on normative expectations that adolescents could do with their parents may be helpful in deterring smoking among children, and that these activities may be especially important for Black families.

Because both mothers' and daughters' reports of mothers' smoking behaviors were included, this study offered a unique opportunity to examine the relative importance of perceived versus actual social influences as well as potential discrepancies between the two reports. Mothers' report of their own smoking status was not associated with girls' smoking. However, girls' perception of their mothers' smoking status was. Although the lack of a significant association between mothers' actual behavior and daughters' behaviors was unexpected, overall, the finding is consistent with problem behavior theory (Jessor & Jessor, 1977), in which influences within the perceived environment are hypothesized to be more directly influential than the actual social environment.

In examining the discrepancies between the two reports of maternal smoking, more than one fourth (26%) of the girls' reports disagreed with mothers' reports. Several explanations for the high number of disagreements in the current sample were explored. Because 16% of the girls reported living in households without their biological mother (i.e., living with a stepmother or grandmother), these girls may have reported their perceptions of their biological mothers'

behavior and not their guardian. However, this proved not to be the case because similar proportions of agreement were found across household structures. Another possibility was that the misperception occurred in cases where the mothers had quit smoking. However, very few girls whose mothers reported being an exsmoker reported their mother to be a smoker. In fact, this misperception accounted for only 21% of the discrepancies and 5% of the total sample.

As previously mentioned, few studies have examined discrepancies between adolescent and parent report of parental smoking. In one of the few studies that have examined such discrepancies, 96% of smokers were correctly identified as such by their children and 10% of nonsmokers were misidentified as smokers (Murray et al., 1985). That study was conducted in England and included girls and boys as well as reports from both fathers and mothers. It may be that, as Robinson and Klesges (1997) suggested, smoking in minority households occurs less frequently and more sporadically, thereby causing greater confusion among adolescent girls on their mothers' smoking status.

The current study found, as was expected, that a girl's perception of her mother as a smoker significantly increased her odds of engaging in smoking behaviors even when her mother reports not smoking. Likewise, perception of the mother as a nonsmoker, even when the mother reports smoking, does not significantly increase the odds of smoking behaviors as compared with agreement of nonsmoking. Again, this is consistent with problem behavior theory (Jessor & Jessor, 1977). However, it was also expected that influence on smoking behaviors would be highest when both mother and daughter agreed that the mother smokes. In fact, agreement on maternal smoking was not significantly associated with experimental smoking. Instead, disagreement, where girls perceive their mothers to be smokers, was the only significant association in the analysis. A different story emerges with smoking intentions: Both groups of girls who perceive their mothers to be smokers are more likely to intend to smoke relative to agreement for nonsmoking. However, the odds ratios for each group are almost equivalent, indicating no difference in the strength of the associations.

It is not clear why misperception of mother as a smoker should be a greater or even an equal risk to correct perception of mother as a smoker. It may be that misperception is an indication of poor mother–daughter communication and family disharmony, which itself is a risk factor for girls' substance use (Liu & Kaplan, 1996; Seguire & Chalmers, 2000). The findings, however, highlight the need for parents to discuss issues around smoking with their children. Clearly stated household policies, rules, and antismoking attitudes by parents have been found to decrease smoking among young adolescents (Chassin et al., 1998; Jackson & Henriksen, 1997; Proescholdbell et al., 2000). It may also be beneficial for parents to speak openly and honestly about their own smoking behaviors and to clear up misperceptions their children may hold. Programs and information geared toward parents should encourage and provide examples of how to talk to children about smoking.

The current study has several limitations that should be noted. Because of the resource limitations of the study, a cap of 500 mothers was set for conducting telephone interviews. Differences were found between girls in the current study and girls in the larger study in terms of race, smoking intentions, and school type. Therefore, the study has a larger proportion of Black girls and Latinas, and findings may not generalize as well to White girls, girls from other racial or ethnic backgrounds, or girls from other environments, such as girls attending private school or living in suburban or rural locations. Likewise, the final sample size ( $N=450$ ) was small given the low rates of smoking in the population, and as mentioned previously, it limits the ability to detect interaction effects. Level of mothers' education, which has previously been found to be a consistent factor in adolescent smoking (USDHHS, 1994), was not significant in the present study. This may be because of the limited range of educational attainment in the current sample. In addition, the current study used cross-sectional data and could not capture maternal influences on cigarette use over time. Longitudinal studies among this population need to be conducted to ascertain how maternal influence on urban minority girls' smoking changes over time.

In summary, the present study highlights several important issues in the development of smoking behaviors among urban minority girls. The current findings indicate that minority girls' perceptions of their mothers' smoking status are an important factor in girls' early smoking behaviors. Mothers' report of their own smoking, however, is not. In addition, maternal influence, in terms of perception of mothers' smoking status and mothers' normative expectations, are particularly important for Black girls as compared with Latinas. This study also demonstrates the importance of mothers' normative expectations of adult smoking as a risk factor for Black girls' smoking behaviors.

### **Footnotes**

1. Girls' age ranged from 11.4 to 15.0 years old. A closer examination revealed only three participants were 14.5 years or older. Separate analyses were conducted excluding these participants. As there were no significant differences in the results, analyses with the full sample are reported.
2. Logistic regressions were estimated excluding all participants where quitting was either in mothers' smoking status variable or daughters' perceptions of mothers' smoking variable. Results were similar to those reported.

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